# GOLD IN THE EARTH

Wonders of the New Processes of Reduction of This Metal.

REVOLUTIONIZING THE PRODUCT

Description of What May Be Seen in a Cyanide Mill.

FROM ROCK AND DIRT

(Copyrighted, 1896, by Frank G. Carpenter.; DENVER, July 15, 1896.



BEGIN WITH THIS letter a series describing the revolution which is going on in the mining regions of the west. During the past three months I have trav eled several thou sand miles in th Rocky Mountains They are alive with prospectors. It is estimated that 2,000

men are climbing about the hills and canons of California Arizona and Nevada. There are hundreds of prospectors going carefully over the old mining regions of Colorado, and in Utah is now being developed a new gold region, which Salt Lake City men claim will produce more than enough to pay off the national debt. The gold now being mined at Cripple Creek is enormous in quantity. and there are other camps in Colorado which are turning out fortunes in goldbearing rock. The new processes of gold reduction have changed almost entirely the character of gold mining and within the next few years the whole world will be reprospected for gold.

Gold Everywhere. It is hard to realize that gold is one of the most common of all the metals, but this is the fact. Gold is to be found in nearly every part of the earth, but hitherto the cost of reduction has been so great and the quantity of gold so small that in only a few places could it be mined at a profit Gold exists in the waters of the sea, and the chemist who can invent a method of getting the gold out of the great Salt Lake will have a fortune. The Andes are full part of the United States. From Nova Scotia to Georgia runs a golden streak, Scotia to Georgia runs a golden stream, which has at different points paid for mining. Nuggets have been recently found in Nova Scotia worth \$200, and last year a nugget was found in Crawford County, N. C., which weighed 8 pound 5 ounces. All a method has been lately invented in Germany for getting the gold out of the rock by electricity. nugget was found in Crawford County, N.
C., which weighed 8 pound 5 ounces. All
of our gold up until 1827 came from North
Carolina and there have long been gold
mines in different parts of Georgia. There is a white quartz near Washington, D. C. which will, it is said, pay \$16 a ton, and Hampshire, which, in 1817, yielded \$50,000, and gold has been mined on Manhattan Island which averaged \$4 a ton. There is the sands of the Pacific ocean, from Puget Sound to the Aleutian Islands, contain gold dust, and in some places they are now being panned by miners. There is probably a large amount of gold in British Columbia, the mountains of which have not been prespected. The Treadwell mine of Alaska has an annual output of more than \$500. 000 and from it has already been taken more than \$5,000,000 worth of gold. This gold is of such a low grade that some years ago no one would have thought of

pecting which is now being done will de-

velop, in all probability, mines containing

the richest of ore, as well as low-grade

mines. Take the Golden Fleece mine, which

new produces from twenty to thirty thous-

and dollars a month, and has been doing so for four or five years. It was located about twenty years ago, worked for a time and abandoned. It was then sold. The buyers worked it and gave it up as a failure. Then a man named Davis, who understood the popular over of the Coldar Place.

peculiar ores of the Golden Fleece, took an option on the property for \$15,000. He ap-

plied new processes to the reduction of his ores, and his first car load netted him the amount of the bond. On the strength of that car load he was offered such a price

for the property that he could have sold out and made \$75,000 on the deal. He went

on mining, and soon struck a big vein. This mine has now 600,000 shares, and I am told that it has already paid about \$500,000 in

The reduction of the low-grade ores will

alone revolutionize the gold product of the

world. The increase is already enormous. The South African mines are to a large ex-

tent low grade. They produced \$40,000,000 worth of gold last year, and \$10,000,000 worth of this would have been lost had it

not been for the new processes of getting out gold by the use of cyanide of potassium. These mines were opened first in 1887. Up to the first of last January they had pro-duced about \$150,000,000 worth of gold, and

Hamilton Smith, the great English mining engineer, estimates that there is more than a billion and a half dollars' worth of gold in the already known fields of South Africa yet to be mined. The Australian mines are

turning out great quantities of gold, and in

1894 both Africa and Australia were ahead of us in gold production. It is only lately that we have gotten these new processes at work upon our ores, but last year we regained our place as the chief gold-producing

country of the world. In 1895 we led both Africa and Australia by more than \$10,000,-000, our gold product last year amounting

to \$50,000,000, Colorado alone had an En-crease in 1895 over its product of 1894 of \$8,000,000, and it stands today as the great-

est gold state of the Union. It produced last year \$18,000,000 worth of gold, or three

millions more than California, and Colorado men tell me that they expect to get at least \$25,000,000 worth of gold out of the moun-

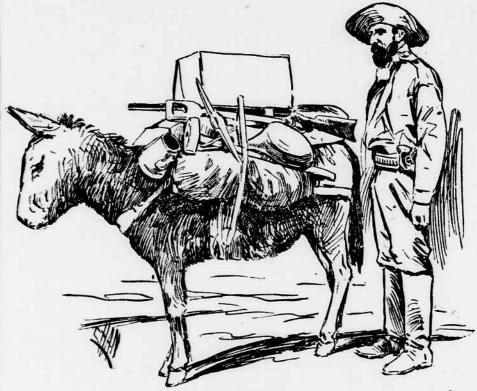
\$25,000.000 worth of gold out of the mountains during the present year. There will be an enormous increase in the gold product of Utah this year, and California, which produced \$15,000,000 worth of gold in 1895, will produce more in 1896. Altogether in 1895 the world produced nearly \$200,000,000 worth of gold. This is a greater amount

than has ever been mined in any one year. than has ever deen inflict in any one year. It is equal to the entire product of any twenty years up to 1840, and if the present ratio of increase goes on we shall in 1900 have an annual product of \$320,000,000, and the world's stock will, between this time and that, have been increased by more than \$2,000,000,000. These figures are inconceivable, but they are founded on fact, and they represent a revolution brought about by a combination of new discoveries in natural resources and new inventions as applied to mining, which will revolutionize the financial system of the world.

The New Cheap Processes.

But let me tell you something of these cheap methods which have lately been invented for getting out gold. You have all heard of placer mining, or the washing of gold grain, nuggets or dust out of the beds of rivers and the sides of mountains. The first mining done was of this kind, and until lately nine-tenths of all of the gold of the world was gotten out in this way. An enormous quantity was then produced by crushing the rock and smelting it. This, by crushing the rock and smelting it. This, however, is a very expensive process, costing \$14 and upward to the ton of rock, and ore which does not contain more than \$20 per ton seldom pays the cost for smelting. By the new processes, if there is \$10 worth of gold in a ton of rock it can be gotten out at a profit. There are immense ore bodies near Salt Lake City, which can be profitably mined for \$2.50 a ton, and there is one mine there where the cost of reduction is not more than 75 cents. I am

fore it can be ground to powder. This is done by passing it through enormous steel tubes of the length of an ordinary railroad pessel. ger coach and as big around as a ficur barrel. Through these tubes flames of gas continually blow. They are inclined at such an angle that the ore going in at the top as they revolve rolls slowly down to the bottom. As it rolls it has this flery bath, and the heat takes all the moisture out of the rock. Then an elevator of iron buckets, much like that which carries wheat up in a flour mill, carries the ore to the top of the works, and it is emptied in steel crushers, which grind it to powder. The ore which we saw before as cobble The ore which we saw before as cobble stones and broken rock has now become a flour. It looks like dust, and it is composed of millions of grains, but each of those grains contains an infinitesimal quantity of gcld, and this costly dust is worth a fertune. The rock was hard and rough. The dust is so soft and fine that you can sub it to and fro in your hands without scratching the skin, and it looks much like powdered pumice stone. It has, however, no gleam of gold, and were it on the road you would drive your carriage



of gold. Central America has hundreds of abandoned mines. The old dumps or waste of the mines which the Spaniards worked in Mexico will now be put through the new processes for getting out the gold, and the result will be fortunes. There is a vast quantity of low-grade gold in the eastern part of the Luited States. From News describes further on Then there is the gold water by the cyanide mill, which I toks like water, but it is water contact the processor of the policy of the gold in the eastern describes for the gold and more than half a million dollars of gold which would have been wasted has been gotten out of Crippie The solution is a fluid as clear as crystal. It looks like water, but it is water contact the processor of the policy of the gold, and more than half a million dollars of gold which would have been wasted has been gotten out of Crippie The solution is a fluid as clear as crystal. It looks like water, but it is water contact the processor of the gold, and more than half a million dollars of gold which would have been wasted has been gotten out of Crippie The processor of the gold, and more than half a million dollars of gold which would have been wasted has been gotten out of Crippie The processor of the gold, and more than half a million dollars of gold which would have been wasted has been gotten out of Crippie The processor of the gold, and more than half a million dollars of gold which would have been wasted has been gotten out of Crippie The processor of the gold, and more than half a million dollars of gold which would have been wasted to another and from which leads from one tank to another and from which leads from one tank to another and from which leads from one tank to another and from which leads from one tank to another and from which leads from one tank to another and from which leads from one tank to another and from which leads from one tank to another and from which leads from one tank to another and from which leads from one tank to another and from which leads from one tank t describe further on. Then there is the chlorination process, by which certain kinds of ore are treated with chemicals

within the past year gold mines have been worked in a small way near the national cyanide of potassium. Cyanide of potas-Island which averaged \$4 a ton. There is gold in Onio and our mountains of the west have, it is believed, hundreds of undiscovered golden veins. In the region between the Rockies and the Facific so far has been produced 99 per cent of all the gold of the United States, and hitherto many mines have been discovered and abandoned, which can now be worked by the new processes at a profit. There are valuable gold mires in the state of Washington, and the first considerable and the Pacific some first process and the first considerable and the process of the pro States was erected in Boulder county, Col. There are now more than fifty cyanide plants in South Africa. There are twenty-four in Australasia and something like twenty in different parts of the United States, with a number of others going up all over the world.

The World's Biggest Cyanide Mill. The biggest and most perfect of all so far erected is that of the Metallic Reduction Works near Florence, which I visited to mine it. Its average is between the other day. Into this mill are poured trying to mine it. Its average is between the other day. The other day. 250 and \$3 per ton, and still at these low car loads of what look like cobble stones.

Florence. They look much like an immense wheat elevator or rudely built big Pennsylvania barts, but they contain the finest machinery of their kind in the world. They suck 97 per cent of the gold out of

the rock which passes through them, whereas the mills of South Africa, it is

said, are able to save only from 60 to 80 per cent. These mills use petroleum as fuel, and the Florence Cripple Creek rail-

oad brings the Cripple Creek ores directly

A Trip Through the Mill.

Let us now take a train load of gold-

bearing rock and follow it through this

graat mill. How the gold is gotten out of

the mine I will describe in another letter.

Our freight cars are filled with the ore.

It is a mixture of broken granite, porphyry

ard other stones of different colors. There is gravel in it. It contains dirt, and it is for all the world like a pile of broken up rocks mixed with the refuse of a quarry of rotten granite. There is not a sign of

gold anywhere. You can take up a piece of rock from any part of the car load and examine it through a microscope and you will not see a glint of yellow or anything which to your eyes would indicate gold.

Still, that rock will average a half an ounce of gold to the ton. In those car loads one atom in every 48,000 is gold, but this atom

is almost evenly mixed throughout the whole, and the question is to get it out.

Costly Dust.

this as we ride on the cars up to the

mill. We are carried by means of an en-

gire on a trestle work track, which lands

the ore at the top of the mill, for the rock

is carried from one level to another by means of gravity. We look down at the lead as we go up. There are specks of stone the size of the head of a pin, and there are immense boulders weighing hundreds of pounds. All this must be crushed

to powder before it can be worked. The car steps at the top and the ore is loaded ir to what looks like a gigantic coffee mill, the top of which is as big around as a hogshead. As the rock falls into it the

The superintendent of the works tells us

THE LARGEST CYANIDE MILLS IN THE WORLD.

figures it gives the proprietors 100 per cent profit. The gold of the Dakotas is of a low of it every month as a result comes a brick

dumped into the tanks. Then the cyanide solution is introduced by means of pipes. The solution is a fluid as clear as crystal. It looks like water, but it is water containing the poisonous cyanide of potassium. It takes about one pound of cyanide to get the gold out of each ton of ore, and as the stuff runs through the dust the mixture looks for all the world like brown mush. It is rush, but it is mush mixed with gold. bromination process somewhat similar, and a method has been lately invented in Germany for getting the gold out of the rock by electricity.

What Cyanide Is.

The most important process, however, is the extraction of the gold by means of cyanide of potassium. Cyanide of potassium is a chemical which looks for all the world like alum. It now costs from thirty to fifty cents a pound. It is made of the heofs, horns and refuse of cattle, and it is deadly poison. It has, however, a wons n ush, but it is mush mixed with gold. however, for the solution to soak all of the gold out of the sand, and it is left for several days upon it. At the end of this time the gold has all gone into the solution and you have this fluid made up of water and gold and cyanide floating around through the mush. The solution is still as clear as crystal, and there is no sign of gold. Now, each of these immense tanks has two bottoms. One is of solid material through which the water cannot pass and the other which the water cannot pass and the other is of canvas. When the dust is first put in the bottom is double, with the solid bottom beneath. After the liquid has been ong enough on the mush the solid bottom is taken away and the solution containing the gold drains out through the canvas and is carried away, leaving almost nothing out the dirt behind. One tank of dust at the estimate of half an ounce of gold to the ton contains a thousand dollars' worth of gold. Of this \$970 worth has gone

n one hundred tons of ore.

We have now several hogsheads of goldprofit. The gold of the Dakotas is of a low grade, and there are hundreds upon hundreds of square miles in Colorado which contain low grade ore. Wagon loads of rock picked up off the grazing fields about Cripple Creek'have assayed \$22 per ton, and old mines which have been abandoned are by the new processes now being worked at a profit.

The Golden Era.

You can never tell where gold is until you the cold miners, and the pros-

FRANK G. CARPENTER.

Easy to Tell a Man's Business From

They were both students at the new school of psychology, physiognomy and metaphysics. They dropped into an all-

icebox?" asked one. "Yes; why?" asked the other. "What business does he follow, judging

from scientific observation?" "He is either a night operator or a gambler." "By what reasoning?"

sion.' The students left the contemplation of

after a long pause.
"Well, what does he do for a living?"

hogshead. As the rock falls into it the mili seizes the stones in its great steel teeth and grinds them to pieces. You hear them apparently groan as they are crushed and you shudder at the thought of getting into the jaws of the machinery. This mill grinds the ore to the size of a walnut. Another takes it and reduces it to pieces the size of a pea, and it is than ready for the dryer. Every molecule of moisture must be taken out of the ore be-

A PROSPECTOR. gions of the north. with the exploit.

> nto the water, leaving a waste of only \$30 Gold From Water.

en water. It looks like common water. It is as clear as crystal, and were it in a pitcher you might drink it by mistake. We know, however, that it has that \$970 worth of gold in it, and the question is how to get it out. If it were salt or sugar we might evaporate the water and the residue at the bottom would be a part of the sugar and salt within it. But gold is not to be and sait within it. But gold is not to be gotten out in that way. It is taken from the water much on the same principle as that by which it has been extracted from the rock. Gold as it exists in the cyanide solution has a peculiar affinity for zinc. If there is an atom of zinc next to one of these molecules of gold it will leave the cyanide water and stick to the zinc. But zinc is expensive, and a large surface is needed to gather all these little molecules of gold. The surface is gotten by having the zinc prepared in circular disks of the size of a dinner plate and about as thick as the head of a pin. These, by means of a lathe, are turned into fine shavings, much lattle, are turned into fine shavings, much like the excelsior used for packing dishes. This zinc excelsior is now put into steel vats about eighteen feet long and four feet wide and two feet deep. These vats have partitions running through them, and each compartment is loosely filled with this zinc excelsior. Now the cyanide solution, with its gold in it is turned into the comparation. zinc excelsior. Now the cyanide solution, with its gold in it, is turned into the vat and so arranged that it will slowly flow about through the zinc excelsior. As the golden water washes the zinc shavings the atoms of gold leave the water and stick to the zinc until at last every bit of water has given up its gold. The zinc under its influence, gradually turns from a bright silver to a dirty yellow. It spows heavier ver to a dirty yellow. It grows heavier and heavier with its golden load, until it has at last gathered all the gold. The sohas at last gathered all the gold. The solution is then drawn off through holes in the bottom of the vat and strengthened up in order to be used to gather more gold. The zinc and gold is put into a furnace and smelted, and after a short time the result is a brick of solid gold, purer than that which is used for medians which is the medians which is used for medians which is the medians which is the medians which is the medians which is the medians which is that which is used for wedding rings or golden eagles.

FORCE OF HABIT.

His Actions. From the New York Press.

night restaurant and were talking of hypnotism. "See that young man over there near the

"Because he is pale and nervous. The sun never shines on him. He has a vocation that keeps his nerves at a high ten-

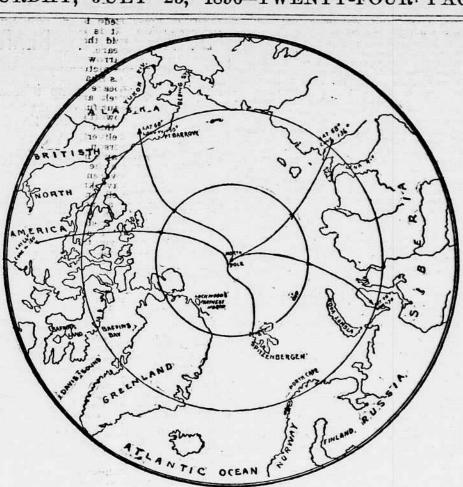
scientific research to investigate the merits of two clam chowders.
"I'll tell you what line of business that man follows," said the second philosopher,

"Well, what does he do for a fiving:

"Paying teller in a bank."

"How do you know?"

"I watched him when the waiter brought
his pancakes a minute ago. He dampened
his fingers and ran them over to see if the



Andree's Perilous Balloon Journey Over Frozen Seas.

ENORMOUS GAS SHIP USED

Description of the Novel and Intricate Apparatus.

STEERING THE COURSE

T MAY BE THAT at this moment a l vast balloon, carrying three adventurous Swedes, is drifting across that mysterious region of the earth known as the North Pole. This is the famous Andree expedition, for which preparations have been in progress in Sweden for many

months. The vessel containing the balloon and its appurtenances, together with the explorers and their assistants, sailed June 7 from Gothenburg, Norway, and was expected to reach Amsterdam Island, Sptizbergen from which the start was to be made, June 18. A dispatch was received about ten days ago from Thomas, Norway, statreach Amsterdam Island, Spitzbergen, was that Andree was about ready to start, and was waiting only for a favorable wind before floating off into the unknown re-

The August Issue of the Strand Magazine contains an interesting description of the Andree balloon and the facts connected

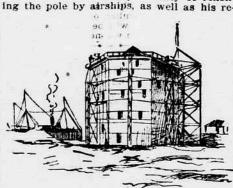
When Mr. Andree first made his proposed voyage known to an English au-



dience (at the geographical congress in 1895) he received but scant encouragement at the hands of men of science, and probably less from the public generally.
One scientific man, indeed, characterized the idea as foolhardy, and in all likelihood the majority of people who have not taken the trouble to follow Mr. Andree's reasoning in the matter may be of much the same opinion. But the same might be said of most of the multitude of expeditions that have gone in search of the pole, as well as of many other undertakings. Every attempt to do some-thing that has not been done before looks feelhardy to most people, until the reasons upon which the adventurer acts are seen o have been justified by results. The idea of attempting to reach the pole by balloon is one Mr. Andree has had in his mind for some years. In 1876, when on his way across the Atlantic, he was struck by the regularity of the trade winds. This led him to reflect upon the possibility of making long balloon voyages, and especially of crossing the Atlantic from Europe to America. The impossibility, however, as he thought, of getting the money for such an enterprise caused the idea to be practically laid aside until 1892. Then the splendid feat of Nordenskiold and the exploits of other Swedish scientists and explorers in the arctic regions excited in Mr. Andree the desire to do something with the balloon in the same regions. Hence arose the idea of utilizing the balloon to cross the polar region and perhaps

Experimental Trips. Up to this time his study of balloons had been mainly theoretical; but now he commenced experimenting practically with them. He first of all made some trips with the Norwegian aeronaut, Cetti. Aftens that he obtained a grant of £300 from a fund for scientific purposes called "Lars Hjertas Minne." With this money he purchased a small bailoon, capable of holding 40,500 cubic feet of gas, with which he made some ten or twelve ascents.

The experience of balloon navigation acquired during these trips strengthened Mr. Andree's belief in the possibility of reach-



Balloon House, Amsterdam Island.

solve to make the attempt if he could get the means wherewith to fit out his expedi-tion. Baron Nordenskield, the celebrated arctic traveller, supported him warmly, and arctic traveller, supported him warmly, and he had not long to wait for the money. He estimated that he would require in all something like f7,220. Woward this sum one Swedish gentleman, Mr. Alfred Nobel, gave 13,490. The king immediately increased it by a gift from his private purse of f1,730;

DRIFTING POLEWARD

Baron Dickson added an equal amount; and a private individual in Stockholm brought the amount up to the required f7,220 by a donation of £300. This practically closed the subscription, but Col. Sell-stroem, a patriotic Swede of Buenos Ayres, sont an additional f200 as he put it "for sent an additional £200, as he put it, "for extras that are sure to be required."

Having thus secured the means for his undertaking, Mr. Andree went to work in carnest. He traveled in England, France and Germany, adding to his knowledge of balloons and their manufacture. On his return he carefully revised what he had seen, drew up the plan of an airship such as he wanted for his purpose, and gave it to M. Lackambre, the famous balloon manufacturer of Paris, to construct, at a cost of 42,000. The Balloon.

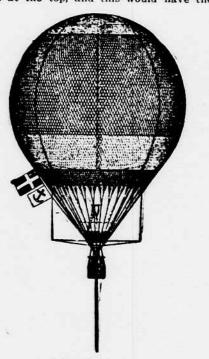
The finished balloon is 75 English feet in height from the appendice, or opening, to the summit, or 97 feet in all from the cap to the bottom of the basket, or gondola, in which the air navigators will have their sleeping place during their sky voyaging. The upper two-thirds of the balloon proper are made of three thicknesses of silk, the lower third of two thicknesses, the whole being stuck together with varnish. In addition two coats of varnish are given to the outside of the silk, and two to the inside; the network in which the balloon is inclosed is of Italian hemp five millimeters in thickness (about 2 in.). At the balloon's largest diameter, the meshes of the netting are about 13 inches square, decreasing in size, of course, as the balloon narrows up-ward and downward. The balloon has no valve at the top, as is generally the case, but has instead two on opposite sides of the equator, and a third at the appendice. This latter is automatic, and is designed to prevent the entrance of air into the baloon. It opens by a pressure equal to ten millimeters (about 4 in.) of water and lets out superfluous gas The upper valves are opened by lines attached to them on the inside, and passing through the balloon near to the automatic valve. The upper end of the balloon is protected by a cap of varnished silk. This is to strengthen it against snow and the rays of the sun. All the ropes-forty-eight in number-oming from the network terminate in the

suspension or bearing ring, the strongest part of the whole apparatus. This ring is made of wood and is seven meters (about 714 yds.) in circumference. Strengthened by cross bars, it serves as a storage place for eserve ropes, anchors, etc.

The spaces between the ropes descending from the network to the suspension ring are covered on the outside by canvas. Inside the canvas are sewn pockets in rows one above another. They number some 300 in others provisions of various kinds, while in others are the materials for a collapsible boat, a tent, and three sledges. This store house, as we may call it, is 15 feet in diameter in the higher part, and has a circumference of 50 feet, while its depth

Steering Apparatus.

The bearing-ring, of course, supports the basket and the apparatus for steering. This steering apparatus is a new feature in ballooning, the invention of Mr. Andree. It consists of guide-ropes and sails. The guide-ropes are three in number, and are attached by means of gearing to the suspension-ring, hanging thence to the ground or the water, as the case may be, and drag-ged along in the wake of the balloon. The ropes are of different lengths, the shortest being 310 meters (about 1,017 feet) in length, the next 320 (about 1,042 feet) and the longest 370 meters (about 1,205 feet), and they weigh a kilogram (about 2 1-4 pounds) per meter. The difference in length is designed to prevent them from hanging close to-gether, in which case, if any of them got lodged, all would be lodged, and the balloon would be stopped in its progress. But if any of the ropes catch separately the bal-loon can be freed, either by the rope break-ing at its weakest point (specially contrived) or by its being detached from the palloon by means of a screw imbedded in the rope 100 meters (about 328 feet) from the suspenson-ring. Supposing one of the ropes were to be caught in something, one of those in the balloon would twist the rope at the top, and this would have the



The Balloon.

effect of releasing a spring, and so allow ing a screw to be unscrewed.

The guide-ropes are trailed after the balloon, of course, exactly in a line with the direction in which the balloon happens to be going. If the end of the rope be moved right or left in the bearing-ring, the balloon will at once turn round an equal distance in the opposite direction, so as still to keep

it exactly in its wake.

Mr. Andree found when once crossing the Baltic, and had dropped the end of a rope into the water to "slow" the motion of the balloon, that the retarding effect of the guide-ropes on the balloon causes it to move with less velocity than the wind does, and at the same time excites a pressure of wind corresponding to the diminution of the velocity. If this pressure acts upon the sail, it will carry the balloon in the same direction. If the sall is at right angles to the direction of the wind, then the direction of the movement will not be changed. But if the sail is brought to a more acute angle to the direction of the wind, the pressure of the wind will cause the balloon deviate from the direction of the wind.

Sails for Guiding. The balloon carries three sails. They are

attached to bamboo spars lying across the pearing-ring and beneath the balloon proper. One is inside the ropes that support the bearing-ring, while the other two are outside the ropes, presenting in all 800 square feet to the wind. The sails are susbeing threaded in and out of the netting.

In the ordinary way the sails would only help to carry the balloon directly before

the wind. But if the guide-ropes are moved a point or two to the right on the bearing-ring, the sails, instead of being directly before the wind, are brought to a slight angle to it, and the action of the ropes dragging behind keeps them there, with the result that the air-ship, in place of going directly before the wind, moves in a direction at a certain angle to it.

tion at a certain angle to it. These guide-ropes serve another purpose in the guidance of the balloon: that is, they tend to keep it at a certain and equal mean

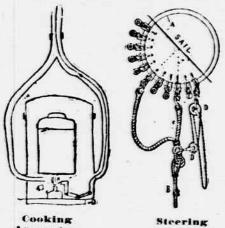
tend to keep it at a certain and equal mean distance from the ground.

"I shall never go beyond 150 meters (about 492 feet) from the earth if I can help," Mr. Andree observed, in explaining the management of his balloon. "I may be obliged to go up higher if I meet with very high land, but so far as possible I shall keep to my mean height of 170 meters."

There will necessarily be a slight mater.

## The Living Arrangements.

The basket, or gendola, is circular in shape, about five feet in depth, and six and one-half feet in diameter. The lower edge on one side is cut away, so that if it strikes the ground it will not turn over. The edge thus shaved away is the one facing the direction the balloon is going. The basket is provided with a strong wicker-work lid, in which is a trap-door large enough for



Apparatus. the exit and entrance of the travelers, whose sleeping place is in the basket. Only one person, however, will sleep at a time, the other two being in the meantime at work in the "leavener two". work in the "observatory," as the space immediately above the basket is called. The observers stand upon the lid, above which immediately above the basket is called. The observers stand upon the lid, above which they have free space of some eight feet. At a convenient height (about three and one-half feet) is a ring of equal circumference with the basket, and upon this are fastened the scientific instruments with which they work; barometers, thermometers, sextants, altazimuth, anemometer, an instrument for determining the direction and velocity of the clouds, one for recording the intensity of the sunlight, another than this. He reckons the balloon's mean than this. He reckons the balloo observations."

It may here be noted that, judging from what is known of the prevailing winds in the polar regions, the explorers arrived at the following conclusions as regards the probable place of their landing:

(1) The greatest probability is that the servers from the wind. Inside, the canvas is provided with pockets for holding recording books, instruments when not in use. A cooking stove has been specially invented to obviate the danger that would arise if cooking were done in too close proximity to the gas. It measures ten inches by seventeen linches, and when in use hangs by a rope twenty-five feet below the roof of the rope twenty-five feet below the roof of the basket. By means of a string running down an india rubber tube, a match is struck and a spirit lamp is lighted. In half an hour water is boiled, soup made, or meat cocked; then by a puff down the tube the

lamp is extinguished, and the food is ready to be hoisted up and enjoyed. It cannot be used, however, in a high wind. Mr. Andree has made something like thirty inventions in connection with the balloon; then manufacturers have made others to overcome difficulties; so that, with Dr. Ekholm's and Mr. Strindberg's, sixty or seventy inventions in all have been made in order to carry out specially the design of the expedition. One of these is an in-

vention by which they will have fresh bread all the time.

A collapsible boat twelve feet in length by four feet in breadth is also carried; the framework of it is of ash, and the covering of silk, the same as that of the balloon. No nails are used in its construction, the keel, ribs, etc., being tied together with sinews. It carries three persons and 600 kilogrammes (about 1.323 pounds)of freight. Two men can put it together in six hours.

Silk for Clothing. The silk used for the balloon and the boat

has been found, when prepared with varnish, so impermeable by wind and water, that the aerial voyagers have had suits made of it to wear when in their sky observatory. Their other clothing includes sleeping bags like those used by Nansen in his Greenland

The sledges, like the frame of the boat. are made of ash. They are nearly three meters (about nine feet ten inches) in length, weigh a little over twelve kilo-grams (about twenty-six and one-half pounds), and carry 100 kilograms (about 220 pounds) each. They are made from the design of Mr. Andree, and the accompanying diagram by him will show in what they differ from the old form of arctic sledge. In short, they are of the same shape top and bottom, so that if the runners get damaged by the ice, the sledge can be turned right over.

A small bucy, made of cork and covered

with copper wire, terminating in a spiral bearing the Swedish flag, is to be dropped at each degree of latitude as a way-mark. Within each is a brass tube in which will be placed a record and chart of progress

Dr. Ekholm is a man bordering on fifty years of age. He is a doctor of science, and one of the best-known meteorologists in Europe. So long ago as 1882-83 he had charge of a Swedish scientific expedition to Spitzbergen, in which Mr. Andree took part. He is the author of several treatises on subjects connected with meteorology. Mr. Andree is an engineer by profession, but is now the examiner-in-chief of the royal patent office in Sweden. He is very tall, standing over six feet, broad-shouldered, and altogether of herculean frame It is possible that he may return from his voyage before completing his forty-second year. In a city notable for handsome men, he is remarkable for his good looks. The third and youngest member of the party, Mr. Nils Strindberg, is, like his chief, a man of magnificent physique, and appar a man of magnificent physique, and apparently well fitted to undergo any amount of fatigue. He is not yet twenty-four years of age; but he has already distinguished himself at the university, especially in science, and is a teacher at the High School for Science in Stockholm.

Both Dr. Ekholm and Mr. Strindberg have

Both Dr. Ekholm and Mr. Strindberg have the greatest confidence in their chief, and fighter?"

well they may, for a cooler or more cour ageous man is rarely to be found.

Three Parts of the Expedition. The expedition naturally divides itself into three parts: The voyage to Spitz-

bergen, the balloon voyage and the journey For the transport of the travelers, their balloon, the materials for inflating it, etc., and the necessary provisions to Spitzbergen, the iron ship Virgo of 5,500 tons carrying capacity, Capt. H. Zachau, was chartered. It sailed from Gothenburg on June 7. Captain Zachau expected to reach his desti-

(about 492 feet) from the earth if I can help," Mr. Andree observed, in explaining the management of his balloon. "I may be obliged to go up higher if I meet with very high land, but so far as possible I shall keep to my mean height of 150 meters."

There will necessarily be a slight variation of distance from the ground, for when the sun shines the gas will be made lighter, and hence the balloon will rise a little. In the same way, if the sky be overcast the gas will be cooled—made heavfer—and the balloon will descend somewhat.

But if the balloon wishes to rise there is at once a check put upon it, because it has to lift the guide-ropes, which are dragging upon the ground or in the water, and which in all weigh 1,000 kilograms (about 2,204 pounds). On the contrary, if there is a disposition to descend, it decreases the weight it is carrying with every foot it sinks, because it has so much less rope to bear, and hence the downward motion is arrested. Thus there is a constant force at work tending to keep the balloon at a mean distance from the ground.

The guide-ropes, four inches in diameter, are for the first 100 meters (about 328 feet) of hemp, the lower part being of coir, and are thoroughly saturated with vaseline to prevent their sinking when in water, and to diminish friction. By means of tackling, the guide-ropes can be moved from point to point of the suspension-ring, as required for the purpose of steering.

The Living Arrangements.

the expedition to Spitzbergen.

Everything being ready, it was Mr. Andree's intention to take advantage of the first southerly wind, if strong enough, to let go his moorings and sail away north, into the regions of eternal ice.

None of the explorers appear to have the least doubt about their coming safely home from their perilous adventure. The only doubt there seems to be in their minds is as to where they will land, and how far they may have to travel ever snow and ice.

they may have to travel over snow and ice before they reach the borders of civiliza-The explorers calculated that they would lose about one cubic foot of gas a day, and that they could afford to lose 1,000 cubic feet without impairing the efficiency of the

balloon. They carry food for about 120 As regards the temperature they will experience, Mr. Andree thinks they will have it about freezing point all the time. "Our chief danger," he adds, "will arise from snow or rain getting frozen on the balloon. show or rain getting frozen on the balloon. If we were to have much snow and it became firmly attached to the balloon, or if much rain were to fall and it froze, that would be a real danger, because it might overweight us and bring us to the ground. But apart from that, I do not see much danger. If we got into a cyclose we could danger. If we got into a cyclone, we could steer out of it, as a ship does."

### The Time Necessary.

Dr. Ekholm's estimate is that under favorable circumstances they may travel at the rate of from twelve to fifteen miles an hour, and that they might reach the jole in six days, and Siberia of the North American continent in two weeks more, "But this," he remarked, "is putting things in the most favorable condition. Possibly we might be six weeks in reaching continental land, and that is really more likely to be the case."

Mr. Andrec's estimate is much shorter than this. He reskops the ballows.

(4) That it will land in British North America in lat. 67 N., long 100 W. Speaking of these probabilities Mr. An-Speaking of the speaking of th

Bering's strait, and be able to go as far as San Francisco, but that is not likely. What would please me the least, perhaps, would be to come down in northern Greenland, which would probably compel us to temain there a year. We might, of course, find ourselves brought right back to Spitzbergen, though that, of course, is hardly to be expected."

to be expected."

Dr. Ekholm took to himself a wife after the expedition was decided upon and he had undertaken to go with it. Personally, he wished to postpone the wedding until his return, but the lady felt brave, and desired that the ceremony should take place without delay place without delay. Neither Mr. Andree nor his younger com-

Neither Mr. Andree nor his younger companion is married.

Mr. Andree's mother is still living, a bright and active-minded lady of seventy. Everything concerning the expedition she watches with the greatest interest. Not an article or paragraph appears about it but she must have a copy, and these she dates and puts away with the greatest care.

care.
Should the voyagers have the good fortune to return, and they should descend in any part of the Russian dominions, they will be given every possible assistance.
Ters of thousands of a circular have been distributed broadcast throughout Siberla, instructing all and sundry what to do should the balloon descend in their midst. Similar circulars have been distributed also in Alaska and British North America.

## Another Kind of Queen.

From Accedotes. A sen of the Marquis of Salisbury has a great love for bees, and, finding one of his hives queenless, he sent an order to Welwyn, the nearest town to his father's beautiful estate at Hatfield, for a Carniolan queen, i.e., a famous Italian bee, and asked to be informed of the probable time of its arrival. The bee master, wishing to serve rival. The bee master, wishing to serve his distinguished customer with all promptitude, sent off the bee by the next train, and wired to Hatfield: "The queen will arrive by 3:40 this afternoon." When the yeung lord reached the station he found the place through with people. The telegraph clerk had jumped to the conclusion that her majestr was paying that her majesty was paying a sudden visit to Hatfield, and, as he was unable to keep such an important telegram to himself, the news spread like wildfire. Great was the disappointment of the peo-

ple when they discovered that the only queen to come was one that the young lord could carry home in a match box in his

## Insufficient Data.

From be Cincinnati Enquirer The inquisitive passenger had hinted around until his patience had worn out, so he asked the dignified passenger: "What

is your business?" The dignified one answered him: "I am a lung specialist." The inquisitive man stayed still for awhile, then he broke out again: "Say, I just happened to think," he said.



The boats on the Park Lake are very pretty and picturesque, but the names do